

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-022237

(43)Date of publication of application : 23.01.1996

(51)Int.Cl. G03G 21/20  
G03G 15/00  
G03G 21/10  
G05D 23/00

(21)Application number : 06-180931

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(22)Date of filing : 08.07.1994

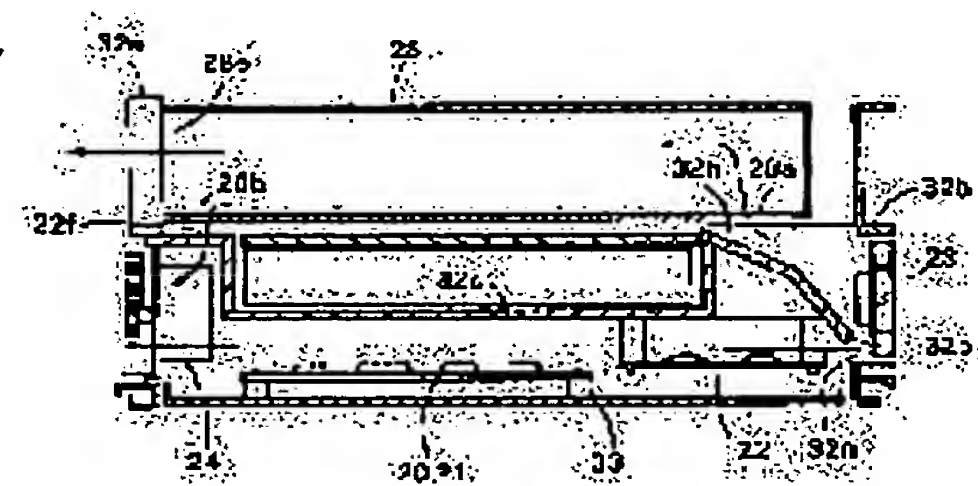
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## (54) IMAGE FORMING DEVICE

## (57)Abstract:

PURPOSE: To execute efficient cooling considering the calorific value of component parts associated with the miniaturization of an image forming device such as a printer.

CONSTITUTION: By attaching a fan 23 to one side frame 32b and arranging a fin 32e constituting a splitting means at a position where it is proximately opposed to the fan 23, air flow generated by the fan 23 is split in two directions, up and down. The air flow split to the upper side is led to the inside of a duct 28. A fixing part having a heating roller is attached to the duct 28 and the duct 28 whose temperature rises by absorbing the generated heat from the heating roller is cooled by the air flow passing inside. As a result, a discharged toner box oppositely arranged through the duct 28 is not thermally influenced by the heating roller in substance. The air flow split to the lower side successively cools a power source unit 22, control substrates 20 and 21 and a motor 24 which are arranged in order of the calorific value from the smallest one, and is discharged to the outside from the other side frame 32a.



## LEGAL STATUS

[Date of request for examination] 26.09.1997

[Date of sending the examiner's decision of rejection] 06.11.2000

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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**CLAIMS**

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[Claim(s)]

[Claim 1] A power source, the substrate which was connected to this power source and made installation connection of the electrical part, and the motor connected to this power source, In image formation equipment equipped with the anchorage device established in the toner image which heated the photoconductor drum by which a rotation drive is carried out by this motor, and the form with which the toner image on this photoconductor drum was imprinted, and was imprinted, and the fan who generates the air flow for cooling Image formation equipment characterized by leading the air flow of shunted another side to said power source and said substrate while carrying out opposite arrangement of the splitting means which carries out splitting of the air flow which said fan generates with said fan, and while was shunted and the air flow was led to the duct arranged along with said anchorage device.

[Claim 2] Image formation equipment according to claim 1 characterized by having attached said duct in one at said anchorage device, and carrying out unitization of said duct and said anchorage device.

[Claim 3] Said image formation equipment is image formation equipment according to claim 1 characterized by having had the waste toner recovery system which carries out scraping recovery of the toner which is further arranged near [ said ] the photoconductor drum circumference, and remains on this photoconductor drum front face, and having arranged said duct between said anchorage device and said waste toner recovery system.

[Claim 4] Said image formation equipment is image formation equipment according to claim 1 characterized by having the frame which supports said photoconductor drum and said anchorage device further, arranging said photoconductor drum and said anchorage device above the bottom wall of this frame, arranging said power source and said substrate under this bottom wall, and this bottom wall carrying out splitting of said air flow up and down with said splitting means.

[Claim 5] Image formation equipment according to claim 4 characterized by drawing the air flow which arranges said motor on another side of the both-sides wall of said frame while arranging the longitudinal direction of said photoconductor drum and said anchorage device for between the right-and-left both-sides walls of said frame to mediation \*\*\*\*\* and stationing said fan to one side of the both-sides wall of said frame, and by which said bottom wall was caudad shunted toward this motor.

[Claim 6] Image formation equipment according to claim 1 characterized by carrying out sequential arrangement of said power source, said substrate, and said motor from the upstream of an air flow at order with little calorific value while leading the air flow of said shunted another side to said power source, said substrate, and said motor.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the structure for cooling the image formation equipment which has a source of generation of heat inside about image formation equipments, such as a printer.

[0002]

[Description of the Prior Art] Exposure according to image data is performed on the front face of a photoconductor drum beforehand charged uniformly with the electrification vessel, and the thing of the format which forms an electrostatic latent image on the surface of a photoconductor drum is in the image formation equipment represented by a printer, facsimile, the copying machine, etc. The electrostatic latent image formed on the photoconductor drum is developed with a toner in the development section, and forms a toner image on a photoconductor drum. This toner image is imprinted by the recording paper with an imprint roller. The toner which remained to the photoconductor drum after an imprint is scratched, are collected in a waste toner box, is forwarded by the development section from a waste toner box with the auger pipe which carries out the interior of the auger spring, and is reused. On the other hand, the recording paper which supports a toner image is sent to an anchorage device, and the recording paper is fixed to a toner image. The anchorage device is constituted by the heating roller and the press roller, it heats the toner image in the record paper with a heating roller, carrying out \*\*\*\* conveyance of the recording paper, fuses a toner image, and is fixed to the recording paper. Into the heating roller of this anchorage device, the interior of the heat sources, such as an electric heater, is carried out, a heating roller is heated by supply of a power source, and the temperature up of the inside of image formation equipment is carried out.

[0003]

[Problem(s) to be Solved by the Invention] By the way, the miniaturization of image formation equipment was called for in recent years, and, as a result, the need of carrying out contiguity arrangement produced the waste toner box and the anchorage device conventionally. However, if contiguity arrangement of an anchorage device and the waste toner box is carried out, while causing problems, such as the thermal effect by the heating roller reaching a waste toner box, and the toner in a waste toner box or the toner in an auger pipe carrying out melting concentration, serving as a toner lump, and causing deterioration of a quality of printed character, it will have a bad influence also to a photoconductor drum.

[0004] Then, even if this invention is the case where it faces miniaturizing image formation equipment and contiguity arrangement of sources of generation of heat, such as an anchorage device, and other component parts must be carried out, it aims at offering the structure for cooling the interior of equipment making it the thermal effect of the source of generation of heat be less than other component parts.

[0005]

[Means for Solving the Problem] The substrate which this invention was connected to the power source and the power source, and made installation connection of the electrical part in order to attain the above-mentioned purpose, The motor connected to the power source, and the photoconductor drum by which a rotation drive is carried out by the motor, In image formation equipment equipped with the anchorage device established in the toner image which heated the imprint form with which the toner image on a photoconductor drum was imprinted, and was imprinted, and the fan who generates the air flow for cooling While carrying out opposite arrangement of the splitting means which carries out splitting of the air flow which a fan generates with the fan, and while was shunted and the air flow was led to the duct arranged along with an anchorage device, it



constituted so that the air flow of shunted another side might be led to a power source and a substrate.

[0006] It is desirable to attach a duct in one at an anchorage device, and to carry out unitization of a duct and the anchorage device, and it is desirable to be arranged near the photoconductor drum circumference, and to arrange a duct between an anchorage device and a waste toner recovery system, if it is in the configuration equipped with the waste toner recovery system which carries out scraping recovery of the toner which remains on a photoconductor drum front face.

[0007] It is desirable that have the frame which furthermore supports a photoconductor drum and an anchorage device, arrange a photoconductor drum and an anchorage device above the bottom wall of a frame, a power source and a substrate are arranged under the bottom wall, and a bottom wall is made to carry out splitting of the air flow with a splitting means up and down. Moreover, the longitudinal direction of a photoconductor drum and an anchorage device is arranged for between the right-and-left both-sides walls of a frame to mediation \*\*\*\*\*. While stationing a fan to one side of the both-sides wall of a frame, a motor is arranged on another side of the both-sides wall of a frame. It is good to make it draw the air flow by which the bottom wall was caudad shunted toward the motor, and while drawing the air flow of another side shunted toward the power source, the substrate, and the motor, it is good to carry out sequential arrangement of a power source, a substrate, and the motor from the upstream of an air flow at order with little calorific value.

[0008]

[Function] In the image formation equipment of this invention which has the above-mentioned configuration, the air flow generated by the fan is shunted toward a 2-way with a splitting means, and one side is led to a duct. The duct is absorbing and carrying out the temperature rise of the generation of heat from an anchorage device, and a duct is cooled by the air flow which flows the inside of a duct. Consequently, to a waste toner recovery system, the thermal effect of an anchorage device does not attain to substantially the member by which opposite arrangement was carried out with the anchorage device through the duct, and a concrete target. Moreover, a power source, a control board, and a motor are arranged in the direction in which the air flow of shunted another side flows, and efficient cooling is performed in order with small calorific value to it.

[0009]

[Example] Hereafter, the example which applied this invention to the laser beam printer is explained, referring to a drawing. First, the whole laser beam printer configuration is explained, referring to drawing 1 R> 1. In drawing 1, the printer 1 has the body covering 2 which can be opened and closed. The paper guide 6 whose medial surface constitutes a part of form path is formed in the inside side of the body covering 2. When troubles, such as a paper jam, occur, in order to perform required processing, the paper guide 6 is in the condition which opened the body covering 2, and can be opened and closed.

[0010] It is equipped with feed equipment 3 free [ attachment and detachment ], and a printer 1 dissociates one sheet at a time with the feed roller 4 and the separation pad 5, and the form by which laminating installation was carried out into feed equipment 3 is sent out to it. The form sent out with the feed roller 4 and the separation pad 5 is conveyed by conveyance roller pair 7a and 7b inside the body of a printer. Exposure according to image data is performed on the front face of a photoconductor drum 9 beforehand charged uniformly with the electrification vessel 8, and the exposure section 10 which forms an electrostatic latent image in the front face of a photoconductor drum 9 is formed in the body of a printer. The exposure section 10 consists of a laser diode 11, a lens 12, and a reflecting mirror 13. The toner box 14 is arranged to the form conveyance direction of a photoconductor drum 9 at the upstream, and the development section 15 is arranged between the toner box 14 and the photoconductor drum 9.

[0011] Above the photoconductor drum 9, contact arrangement of the imprint roller 16 is carried out with the photoconductor drum 9, a form is led between a photoconductor drum 9 and the imprint roller 16, and the toner image formed on the photoconductor drum 9 is imprinted in a form. The fixing section 19 which consists of a heating roller 17 and a press roller 18 is arranged at the downstream of a photoconductor drum 9, and the toner image imprinted by the form is fused in the shape of rubber, and it is fixed to a form. It is the fixing section 19, and also the conveyance rollers 29a and 29b of a form are arranged at the downstream. Moreover, under the exposure section 10, control boards 20 and 21 and a power supply unit 22 are arranged. LED25 (refer to drawing 5) for other displays of two or more manual operation buttons is formed in the covering object 23 which constitutes housing.

[0012] Contiguity arrangement of the waste toner box 27 is carried out with the photoconductor drum 9 at the

downstream of a photoconductor drum 9. The waste toner box 27 is for carrying out scraping recovery of the toner which remains to the photoconductor drum 9 after an imprint. This waste toner box 27 and the development section 15 forward the waste toner which is connected in the auger pipe (not shown) which carried out interior, and collected spiral auger springs (not shown) with the waste toner box 27 in the development section 15 in rotation of an auger spring, and reuse it. In addition, it can detach the toner box 14, the development section 15, a photoconductor drum 9, and imprint roller 16 grade among the various components which constitute the printer 1 shown in drawing 1 and attach freely to a printer 1 as a process unit 26 by which unitization was carried out.

[0013] Drawing 2 shows the perspective view of the body frame 32 of a printer of this invention, and drawing 3 shows the sectional view of the printer cut in accordance with the shaft orientations of a photoconductor drum 9. The body frame 32 consists of bottom wall, i.e., support frame, 32c which connects two side frames 32a and 32b set up right and left and these two side frames 32a and 32b. On support frame 32c, a photoconductor drum 9 and fixing section 19 grade are arranged, and between both side frame 32a and 32b, a process unit 26 and the fixing section 19 mediate, and are being fixed so that axis of rotation of both the rollers 17 and 18 of a photoconductor drum 9 and the fixing section 19 may be prolonged in mediation \*\*\*\*\* in between both side frame 32a and 32b. The fan 23 of an absorption mold is attached in 32g of openings which while was set up by support frame 32c and formed in it at side frame 32b, and the motor 24 (R> drawing 3 3 reference) for rotating a photoconductor drum 9, the feed roller 4, conveyance roller 7a, and heating roller 17 grade is attached in side frame 32a of another side. Control boards 20 and 21 and a power supply unit 22 are arranged in support frame 32c and its lower part in the space between the wrap bottom walls 33.

[0014] As shown in drawing 3, fin 32e which constitutes a splitting means is arranged by the inside of side frame 32b in the location which carries out contiguity opposite with a fan 23. From support frame 32c, the downward tilt of the fin 32e is carried out to one, it is formed in it, and the fan 23 has the configuration which carries out splitting of the air flow which attracted and generated the open air to a vertical 2-way. 32h of openings is formed in support frame 32c which corresponds to the up location of fin 32e. a support frame 32c top -- both the side frames 32a and 32b -- mediating -- a photoconductor drum 9, and the heating roller 17 of an anchorage device 19 and the press roller 18 -- the duct 28 is arranged by physical relationship in parallel with each shaft orientations. A cross section is the hollow tubed part material of a flask configuration, and the duct 28 is fabricated with the quality of the material excellent in thermal conductivity like an aluminum containing alloy. Opening 28a is formed in the inferior surface of tongue of the duct 28 which corresponds to the up location of 32h of openings, and the edge of the duct 28 by the side of side frame 32a was formed as opening 28c, and it is wide opened to the exterior, without being blockaded by side frame 32a. Opening 28b is formed also in the inferior surface of tongue of the duct 28 near the side frame 32a. 32f of openings is formed also in support frame 32c [ directly under ] of this opening 28b, and the space where a control board 20 and 21 grades have been arranged by Openings 28b and 32f with the duct 28 interior and support frame 32c down side is in the free passage condition.

[0015] The fixing section 19 which consists of a heating roller 17 and a press roller 18 is arranged at the form conveyance direction downstream of a duct 28 as shown in drawing 4. The duct 28 is arranged in accordance with the shaft orientations of a heating roller 17, and the duct 28 is attached in frame partial 19a of an anchorage device 19 with the screw etc. In the phase of the assembly of a printer 1, the duct 28 and the anchorage device 19 are unified beforehand, and both are incorporated as components by which unitization was carried out.

Moreover, as shown in drawing 1, the photoconductor drum 9 is arranged at the upstream of a duct 28, and the waste toner box 27 is arranged between the photoconductor drum 9 and the duct 28. In addition, a miniaturization is planned compared with the conventional thing, the distance between a photoconductor drum 9 or the waste toner box 27, and the heating roller 17 of the fixing section 19 is comparatively close, and the printer 1 of this example is in the physical relationship by which a photoconductor drum 9 and the waste toner box 27 are influenced of a temperature rise by generation of heat from a heating roller 17 in the condition of not forming a duct 28.

[0016] Under support frame 32c, sequential arrangement of a power supply unit 22, control boards 20 and 21, and the motor 24 is carried out toward side frame 32a at order with little calorific value from side frame 32b.

[0017] Next, in the printer 1 constituted as mentioned above, cooling inside the printer attained with a fan 23, fin 32e, and a duct 28 is explained.

[0018] Splitting of the air flow generated by the fan 23 is carried out to support frame 32c a top and the bottom by fin 32e. There are few amounts of the air flow which shunts most toward the bottom among the air flows generated by the fan 23, and turns splitting down from the physical relationship of the configuration of fin 32e, fin 32e, and a fan 23. The air flow shunted toward the bottom passes through the inside of \*\*\*\* him and a duct 28 in a duct 28 from opening 28a of a duct 28, and is emitted to the exterior through opening 28c. Therefore, the heat generated in the fixing section 19 is mostly intercepted to the waste toner box 27 and a photoconductor drum 9, and the problem of a toner dissolving with the heat of it is lost. A part of air flow in a duct 28 is emitted outside through the grid-like slit which is discharged by the support frame 32c bottom through Openings 28b and 32f, and is formed in side frame 32a. On the other hand, the air flow shunted to the bottom carries out sequential passage of a power supply unit 22, control boards 20 and 21, and the motor 24, and is emitted to the printer exterior. Since a power supply unit 22, control boards 20 and 21, and a motor 24 are arranged from the upstream of an air flow at order with little calorific value and support frame 32c dissociates with the fixing section 19, it is also rare to influence being influenced of the heat from the fixing section 19 of the heat from other circuit elements few, and is cooled efficiently.

[0019] Drawing 5 shows the connection relation of the electric system by this invention. It will start, if a power supply unit 22 changes alternating voltage into direct current voltage and a printer power source is turned ON. The power supply unit 22 is always impressing the direct current voltage of 5V to central control unit (CPU) 20a. To a fan 23, the direct current voltage of 24V is always impressed, and during operation of a printer 1, a fan 23 rotates and cools the interior of a printer under control of CPU20a. As for the motor 24 of 5V, the direct current voltage of 24V is impressed to a laser diode 11. Power is supplied to the motor 24 which is a driving source for rotating the laser diode 11 and photoconductor drum 9 grade which are the light source of the exposure section from the power supply unit 22 through the interlock switch 35.

[0020]

[Effect of the Invention] Since the air flow generated by the fan was led to the duct arranged by meeting a power source and a control board in one side, and meeting an anchorage device in another side with a splitting means according to invention according to claim 1 so that clearly also from the example of the above-mentioned invention, the member which counters through an anchorage device and a duct can be intercepted thermally. Moreover, efficient cooling can be performed by the air flow which the power source and the control board also became independent of.

[0021] According to invention according to claim 2, since unitization of a duct and the anchorage device was carried out and carried out to one, it can build like an efficient erector and working capacity can be raised as a result.

[0022] According to invention according to claim 3, since the duct was prepared between the anchorage device and the waste toner recovery system, even if the anchorage device and the waste toner recovery system are close in distance, a waste toner recovery system is not influenced by the heat emitted from an anchorage device, but the waste toner in a waste toner recovery system fuses it, and it does not have a bad influence on a quality of printed character.

[0023] Since according to invention according to claim 4 to 6 divided the cooled member up and down, it was arranged, the thermal effect from an anchorage device was lessened for the power source and the control board and the cooled member has been arranged in order with small calorific value from the upstream of an air flow, efficient cooling can be performed.

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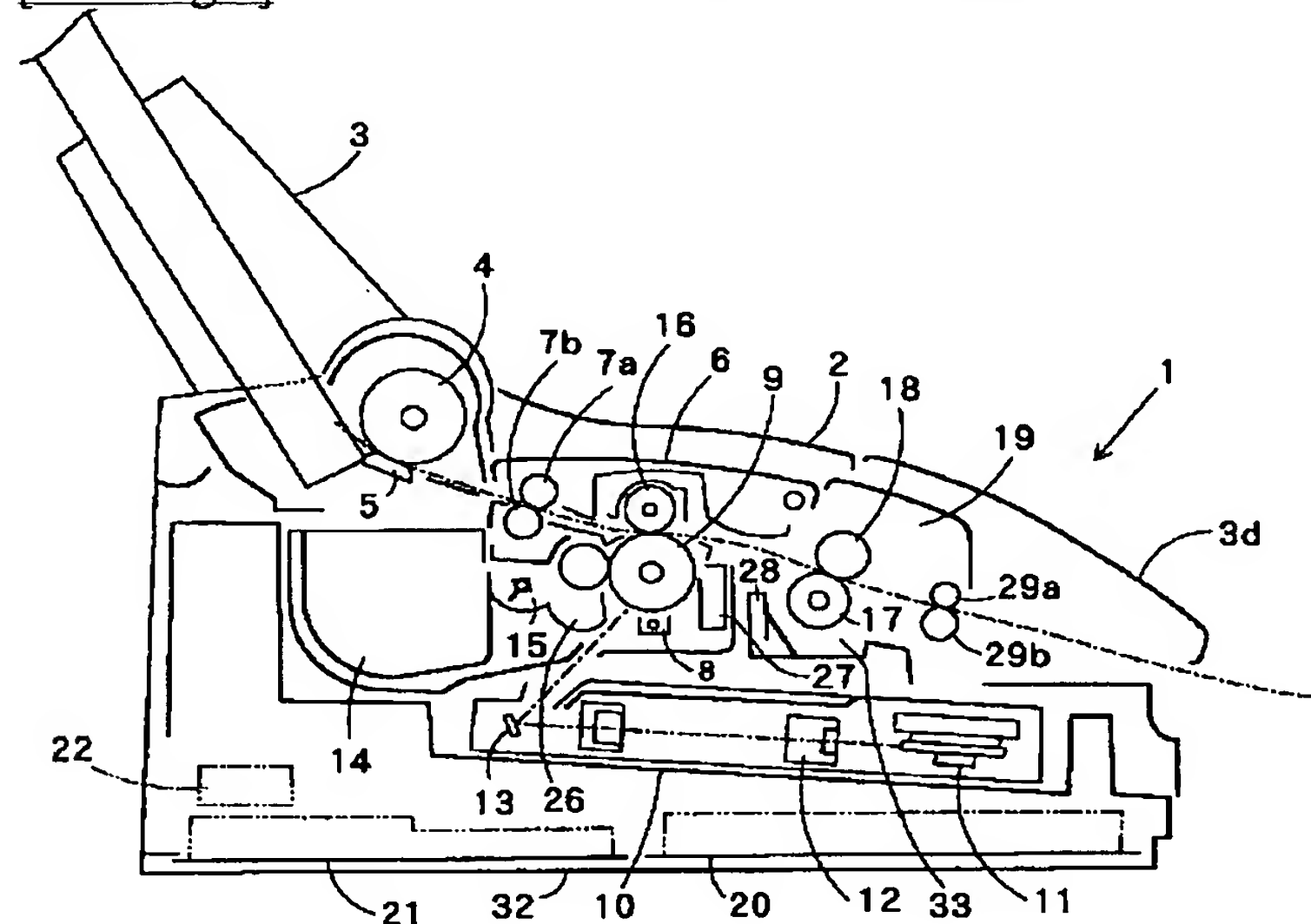
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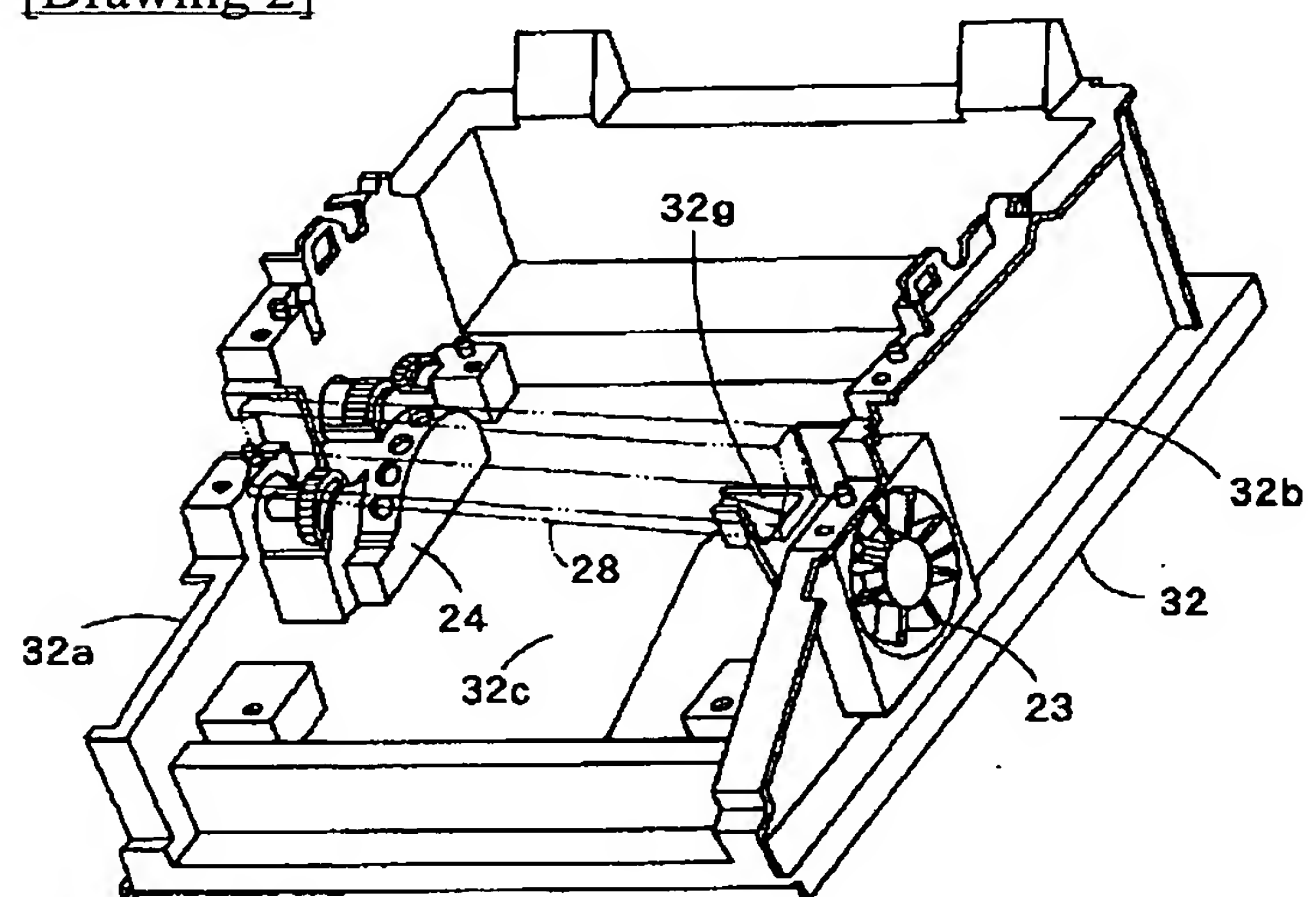
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## DRAWINGS

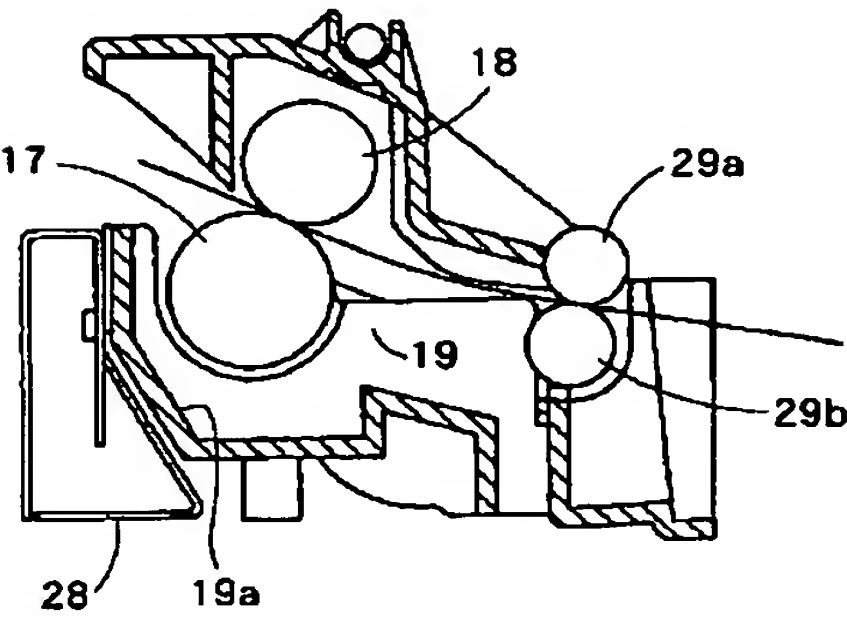
[Drawing 1]



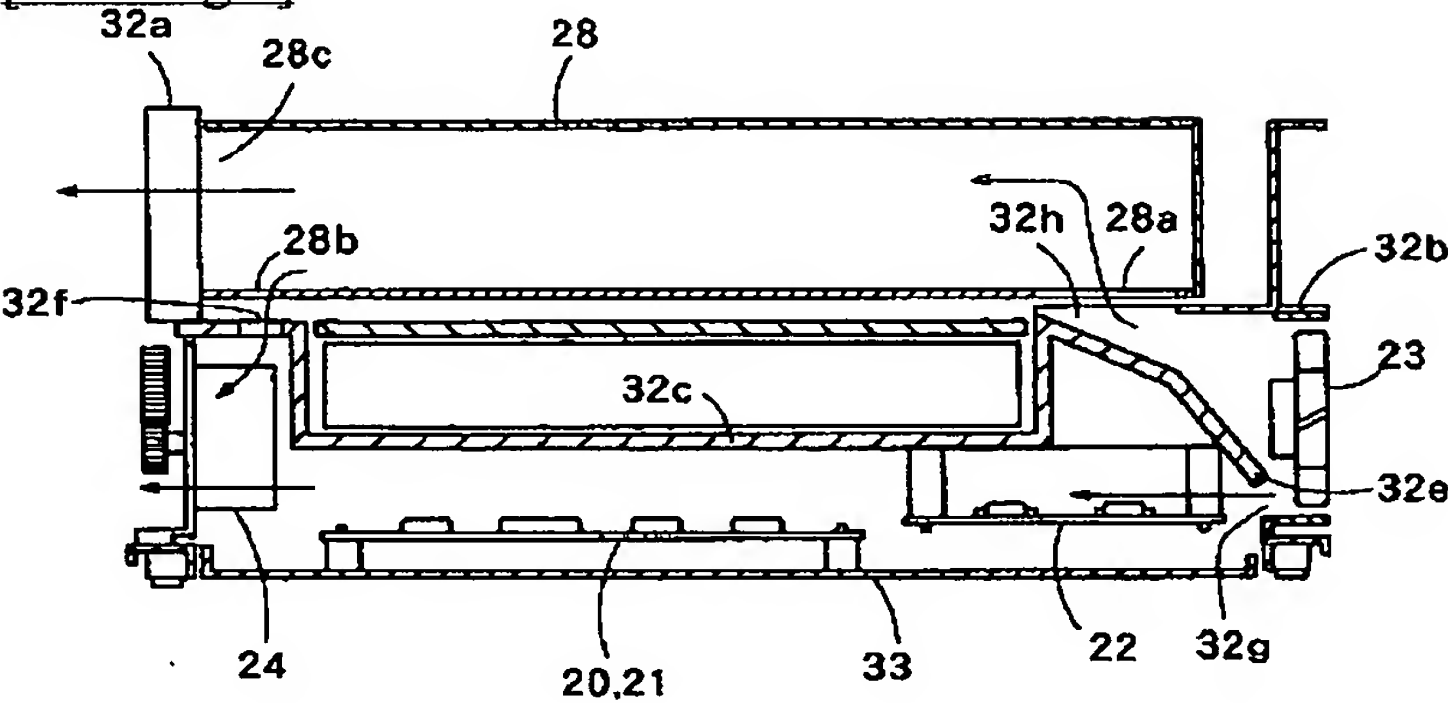
[Drawing 2]



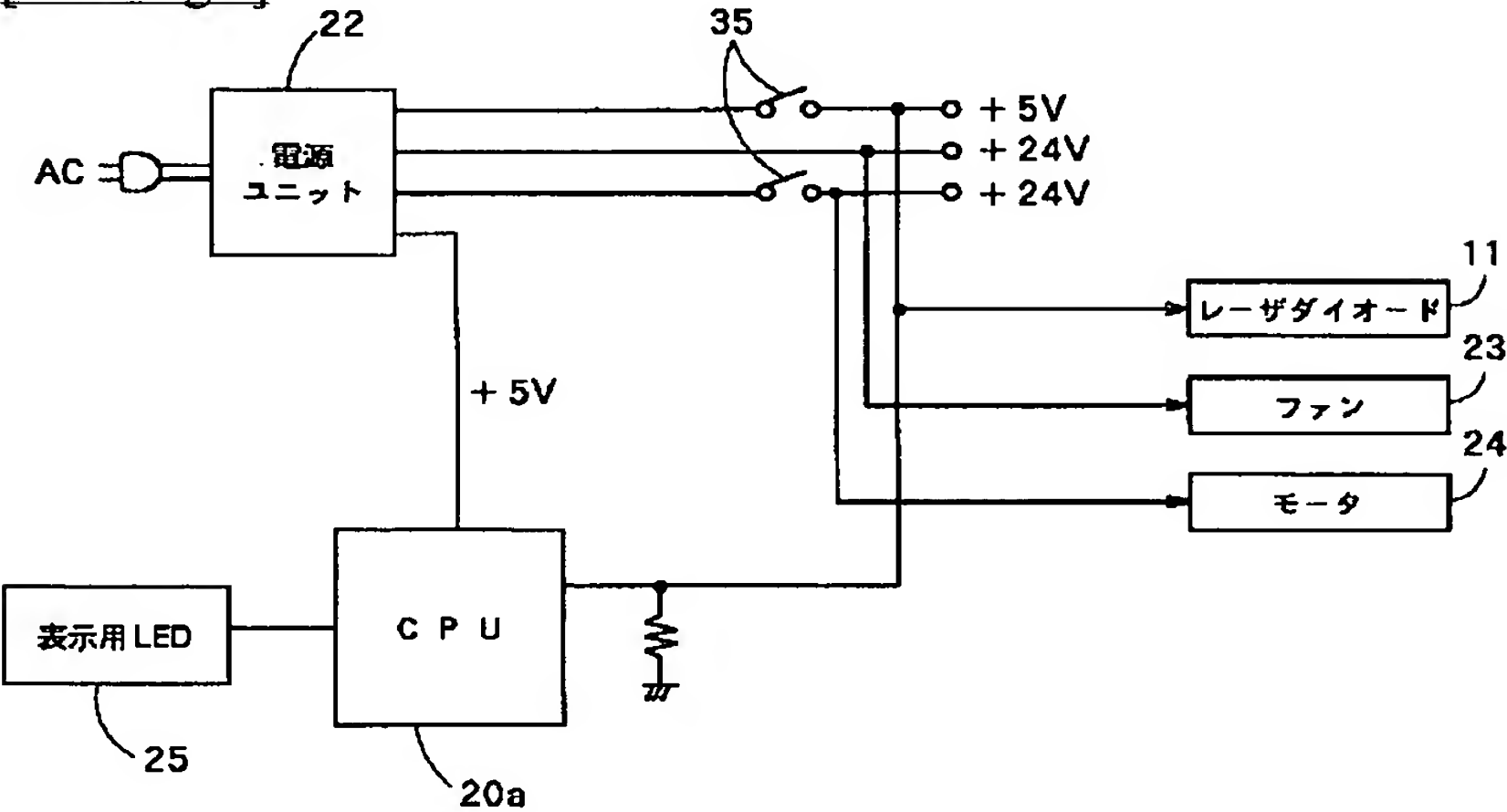
[Drawing 4]



[Drawing 3]



[Drawing 5]



[Translation done.]